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ABSTRACT

This paper focuses on the changes taking place in the behavior of those engaged in research and teaching as a result of the increasing availability of source material on the Internet. It first discusses who customers are and what they are using information sources for. It then looks at the range of new services that are on offer, and reviews a number of pieces of research which provide evidence for the way users are adapting to the Internet as an information resource. The report discusses "ingentaJournals," a database with over 1000 journal titles mounted and available to subscribers. The paper concludes that there is an increasing need for ongoing research into how user behavior is changing as new services and new opportunities for changed methods of research and working evolve. (Contains 30 references.) (AEF)

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Is the Customer Always Right? End-user Services in a Networked Age

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1. Abstract

This paper focuses on the changes taking place in the behaviour of those engaged in research and teaching as a result of the increasing availability of source material on the Internet. It first discusses who customers are and what they are using information resources for. It then looks at the range of new services that are on offer, and reviews a number of pieces of research which provide evidence for the way users are adapting to the Internet as an information resource.

It concludes by suggesting that user behaviour is complex and diverse. It suggests that there is evidence that it varies by age, by experience and by discipline, and that there isn't likely to be any one single approach to networked information provision that will meet the needs of all.

2. Introduction

As professionals in the library and information business, we are all aware of the increasing importance of the Internet in scholarly communication. There is evidence that teachers, researchers and students are increasingly turning to the network as their preferred information source. Yet there seems to be relatively little research into user behaviour in this rapidly changing environment.

This paper will examine some of the evidence that confirms that user behaviour is indeed changing, but which suggests that this is not always in expected or uniform ways. It will try to identify those services and facilities that different groups of users are finding helpful, and will speculate on which services are likely to succeed in the future, and whether or not libraries will be among them!

3. Users as customers

3.1 Introduction

Information professionals are given to employing the term 'users' to denote people who access their services. For some time now I have been uncomfortable with the term, because it has connotations of a captive audience. It isn't a term you hear in the commercial world – Ford doesn't have 'users' of its cars, it has 'customers'. This seems a more appropriate term to use in the increasingly competitive world of information services, when members of teaching and research institutions have a plethora of sources to draw on, not all of them provided directly by their host organisation.

3.2 Who are they?

This has become an increasingly difficult question to answer. In the UK, when I was a student in the early '60s, a relatively small proportion of the UK population (between 5 and 10%) attended a university degree course. They went to a fairly small number of universities, more often than not in a town or city remote from their home. 'Going to university' meant a journey away from home, both literally and in other ways too.

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Today the picture has changed enormously, and I suspect that the changes in the UK are echoed in other countries. It is acknowledged though that there are large variations across the globe. The UK, for example, appears to be moving towards a US model for higher education. The participation rate has increased to around 35%, and the number of institutions offering degree courses has multiplied by a factor of three. The economics of higher education have changed too. State support for the living costs while studying is now only available to those on below-average incomes, and recently we have seen the introduction of tuition fees. There are many more mature students too and the average age of a student is now said to be over 21. The combination of these factors has resulted in many more students staying at home while attending university, and interested in using information resources and even course modules remotely via dial-up telephone links.

3.3 What are they doing?

The manner in which education is delivered and the ways in which students perform their studies has also changed greatly. Teaching has become more 'student centred', despite the fact that the teacher/student ratio has dropped significantly with the growing numbers of students. There is more emphasis on project work, and services such as our own bibliographic database services suggests increasing numbers of accesses by undergraduate students. The usage graph of our ISI bibliographic database service over the last 8 years (Fig 1) shows a steadily increasing differentiation between peak usage during term time, and the troughs during the vacations, suggesting heavy undergraduate usage of a service that might primarily be thought of as a research resource.

3.4 Users as customers in a networked world

Part of this change can be attributed to an increasing awareness of the internet by new students who have learnt about it at school and at home. More and more students arrive with at least some computer skills, and this trend will certainly continue.

Meanwhile, the network is providing opportunities for institutions to market themselves to their customers. And this doesn't mean just advertising their courses. An increasing number of institutions are offering distance learning options, with the internet as a key component.

4. New customer services

4.1 Introduction

So what services can this new generation of students expect from their host institutions? There are many and their diversity seems to be increasing all the time.

4.2 Searching tools

There are many tools available now for using the network to track down material that is published somewhere on the network. Search engines try to catalogue the whole internet with varying degrees of success. It is interesting to try a search term on several of the major search engines such as Alta Vista, Yahoo, Lycos etc and compare the results. There are suggestions that the network has already grown too large for this approach to continue to be effective, and anyway, they cannot 'see' material that is only available behind authentication gateways.

Library catalogues are the traditional way to find out if a library has a particular item at the book or periodical level, and there are now on the network several combined catalogues that have become information resources in their own right. COPAC [1]in the UK is an example of this, combining the catalogues of 15 or so major research libraries.

Bibliographic databases provide information at a finer level of granularity, describing individual articles in

published journals, and enabling people to search using key words or phrases or author names. These have been available for several years now, and our experience with the BIDS [2] service suggests that they have become very important to researchers. A recent survey elicited the following comment from one respondent which was not untypical "I don't know how we managed before there was a BIDS service! I am a regular user and I find it an essential requirement for keeping track of publications in my areas of interest." Although referring to this specific service, it is fair to surmise that this comment can be generalised for all bibliographic data services, whether networked or on CD-ROM.

4.3 Full text services

The current big area of development is the delivery of full text articles to end-users over the network. There are many different services available at the time of writing, and undoubtedly many more about to appear. They can be broadly divided into those provided directly by publishers and those provided by intermediaries. Some of the larger publishers have been providing access to the full text of their journals from their own web sites for several years now. One of the best known is the Academic Press IDEAL [3] service, with mirror sites in the UK and the USA, providing access to a collection of over 180 journals as a 'package deal'. There are many others, not least Elsevier's Science Direct Service [4]. All of these services depend on users visiting their company web site and using their own search interface.

An alternative approach which is gaining ground is access via some sort of consolidation service. Subscription agents have been at the crossroads between publishers and libraries for many years, and all the major ones, such as Swets [5], EBSCO [6], Dawsons [7] and Blackwells [8] have capitalised on their position to set up electronic services, with combined bibliographic databases of articles from a range of publishers and links to full text. Other organisations which have been networking bibliographic databases for some years have also joined the full text club. One of the best known is OCLC [9]. My own organisation, now known as ingenta [10], has also been offering services in this area for a couple of years. At the time of writing over 1000 journal titles are available through the ingentaJournals service, either through a combined database, or indirectly through well known bibliographic databases such as ISI's [11] Citation Indexes, with hypertext links from the search results screen to the full text (Fig 2).

Each of these services offers different economic models. Many started out charging for access to the combined bibliographic database of full text articles, as well as charging for access to the journals themselves. Some have now changed their policy and have moved towards the same model that ingenta is using, namely providing totally free access to the database on the 'shopping catalogue' model, and only charging for articles on a subscription or document delivery model.

4.4 Focused services

All the above services tend to be general services not specific to any particular discipline. Exceptions are some of the bibliographic databases which have emerged with particular subject specialisations. Two well-known and respected examples in the medical field are Medline [12] and EMBASE [13]. In the engineering field, Compendex from Engineering Information is a popular product.

In recent years there has been growing interest in trying to provide some sort of structure for the resources that are available over the network, to guide those working in a particular area of research or teaching towards information and services that are of particular interest to them. Such an approach is not new. Before the huge growth of the Internet, ISI published their Current Contents booklets, containing copies of contents pages from a large collection of journals. These were published in a number of different editions for different discipline areas and were extremely popular. Libraries also routinely organise their physical collections into subject areas, with different disciplines being catered for on different floors or sections of the building, or even different buildings. And departmental libraries are also common, with collections focused on the interests of their particular discipline.

So it seems a natural development to emulate these structures in electronic services. Three recent initiatives in the UK in the area of organisation of electronic resources are 'Clumps', SBIGs (Subject Based Information Gateways), and Hybrid Libraries.

Clumps is the rather unusual and slightly inelegant term that is being used in the UK at the moment to refer to a set of projects that are experimenting with creating services that will simultaneously search a number of different resources via a single interface. Communication between the search system and the target services uses the Z39.50 protocol. There are currently four Clumps projects [14], three involving geographic-based clumps (Cairns – Scotland, M25 Link – London, and RIDING – Yorkshire and Humberside), and one focusing on a subject-based clump (Music). Some of the projects involve public libraries as well as academic research libraries.

Subject Based Information Gateways (or SBIGs) have been around in one form or another for quite a while now. They work by providing links to a number of subject-related resources, together with descriptions of them. They tend to be hand-picked, described and catalogued, with links regularly checked and updated. Outside the UK, there are semi-commercial offerings such as Ei Village [15] from Engineering Information Inc. Examples in the UK include SOSIG [16] (Social Sciences Information Gateway), EEVL [17] (Edinburgh Engineering Virtual Library), and OMNI [18] (Organising Medical Networked Information). The creation, building and maintenance of subject gateway services such as these has been encouraged by the ready availability of a toolkit known as ROADS [19] (Resource Organisation And Discovery in Subject-based services).

The term Hybrid Libraries is being used to describe services or initiatives that are working towards integrating access to resources, whether electronic or print, in as seamless a way as possible. The concept recognises the fact that libraries are going to contain a range of resources delivered by different technologies for many years to come, and the idea is to develop systems to integrate access to these resources in a working library environment. A recent article [20] in D-Lib describes the concept of hybrid libraries in some detail.

5. What do users like?

5.1 Users are people

Earlier in this paper I suggested that the term 'users' was inappropriate in the 'free market' Internet environment that we all work in nowadays. I proposed the term 'customers' as an alternative, but of course what we are talking about is people. And we know from everyday experience that people are all different. In particular, the students, research workers and academic staff that populate our education and research establishments are human beings with a variety of experiences, knowledge, interests and working methods.

Although such generalisations are dangerous, it is sometimes suggested that those who are attracted to the sciences tend to be somewhat introverted, convergent thinkers, while those working in the arts and humanities are more outgoing, outward looking and open to new ideas. Even if this is unfounded, we all know that people have different methods of approaching work and study.

Another factor relevant to the subject of this paper is the fact that, in the context of the use of computer and network based resources, people are changing. By this I mean both that individuals are gaining experience, and that each new generation of students is arriving at university with an increasing awareness and familiarity with computer-based information systems.

One more issue that is relevant is the fact that, given the choice, people generally like to control the environment in which they work and study. They exercise this choice by having preferences for different computer systems, word processing packages and other tools, network browsers etc. Although the vast

majority of computers in use are Windows based PCs, running packages such as Microsoft Word, a closer inspection of individual machines shows a huge variety of detailed different settings and options, expressing the preferences of the user.

Taking this idea a step further, there is some evidence that, given a choice, many people prefer to use a remote information system in as local a way as possible. This manifests itself, for example, in people conducting fairly crude searches on the remote system, then fetching the resulting large hit set back to their own computer and refining it using local tools such as word processors or bibliographic database packages.

In the remainder of this paper, I will examine evidence from a number of different sources to back up this claim of a very heterogeneous user population grappling with a large and growing range of services in a variety of individual ways and suggest how, as information professionals, we should react to this variety of user needs and behaviour.

5.2 Experience of BIDS/ingenta services

5.2.1 Description of services

I will start by looking at my own service, widely known as BIDS, now jointly owned by the University of Bath and a new company called ingenta ltd.

BIDS offers a range of services, though it is best known for provided end-user access to the bibliographic databases supplied by ISI known as the Citation Indexes (Science, Social Sciences and Arts & Humanities). We also mount the ISI proceedings database ISTP, together with a variety of other bibliographic database services such as EMBASE, Compendex, INSPEC, etc. The establishment and growth of the service has been well documented [21].

Since 1997 we have also been providing access to a range of full text journals supplied by a number of leading publishers. This service, now known as ingentaJournals, will soon have over 1000 journal titles mounted and available to subscribers. The service is cross-linked to the bibliographic services so that search results from, for example, the ISI Social Sciences Citation Index, will show a hypertext link alongside articles in the results display where a full text article is available in ingentaJournals (Fig 2).

The use of the these services, and the ISI service in particular, has grown steadily since the service was launched in early 1991, and at peak times over 12,000 people a day login to the ISI service alone. With over 300,000 accesses a month, it is clear that a very large proportion of the UK HE population is aware of the service and makes use of it. And there is evidence of further unsatisfied demand for it, since we have had to turn away a large number of attempted accesses this year (1998-99) because the system is fully loaded.

The first point to make is that this one service has clearly made a mark on the research methods of this group of users. In other words, the existence of the service has changed the way in which they go about doing background research for new projects, check references for papers they are writing, check on progress with other competing research groups etc.

The second point is that there is evidence that the service is being used in ways that might have been difficult to predict. The service is available through three different interfaces – the original telnet interface, an early web interface, and a more recent web interface using frames and JavaScript. One of the puzzles was why so many people were continuing to use the telnet interface, especially as there were several facilities only available on the web. A survey [22] was commissioned and it was discovered that many were using telnet as a conscious choice. They knew how to use it, were trained on it, and found it to be much quicker than the web interface. They had tried both, but come back to the telnet interface.

Fig 2 - Screen Shot – BIDS ISI Citation Index Service Showing Full-text Linkage

Another surprise which emerged from a survey of users of the web services [23] was the very large number of users who, even with the web interface, choose to have their results e-mailed back to themselves (61% overall, 69% of those who classed themselves as 'researchers'). This contrasts with only 8% who choose to download their results immediately into a file from the browser. Having captured the results, 29% then manipulate the results locally using a personal database system or a word processor. This rises to 40% for teaching and support staff.

A further example of people's desire to move the centre of gravity of their activities from a remote service to their desktop is the immense popularity of a current awareness service introduced last year called 'AutoJournals'. This allows users to nominate up to 50 journals of their choice; then, whenever details of a new issue of a chosen journal is loaded into the system, it automatically e-mails the information to them, typically in a table-of-contents format. Even with relatively little publicity, over 10,000 lists have been set up since the facility was launched last year.

Finally, in the last 6 months or so, we have had an unprecedented number of enquiries about the possibility of Z39.50 access to the ISI service, apparently prompted by the introduction of a Z39.50 interface with the EndNote package. This is now being introduced. Again, an example of the popularity of moving control closer to the user.

5.3 Australia & New Zealand experience & survey results

5.3.1 BIDS IBSS Online service to Australia and New Zealand

In 1998, over 30 universities in Australia and New Zealand took part in a 3 month trial of the networked BIDS bibliographic database – IBSS Online. The International Bibliography of the Social Sciences is a UK-based service [24], supported by the JISC (Joint Information Systems Committee) and the ESRC (Economic and Social Research Council), and managed by the BLPES (British Library of Political and Economic Science) at the London School of Economics. As a result of the trial, 10 Australian and New Zealand universities are now subscribing to the service.

The database covers over 2,300 social science journals per year from over 100 countries. Although database entries include a number of descriptive fields such as discipline codes and subject and geographic descriptors, very few of the articles currently have abstract texts (though these will start to be added this year for about 50% of articles).

At the end of the trial, an e-mailed survey was sent to each of the 32 participating universities, of which 26 were completed and returned. A significant outcome was the importance placed by sites on the time span of the database (which covers material back to 1951). 18 respondents marked it as a very attractive feature and a further 6 as marginally attractive.

As for links to full text, although this was marked as being of significant interest by most sites, for those that purchased the service, it wasn't a major factor in the purchasing decision. This might be because full text is only available for about the last 3 years, a small proportion of articles which span nearly 50 years of research. So, for this particular group of users (social scientists), the half a century time coverage appeared to be a more important factor than the ability to link directly to full text articles.

5.3.2 'Information Online and On Disc 99' Conference (Sydney)

In January 1999, the biennial 'Information Online and On Disc 99' conference and exhibition [25] was held in Sydney, Australia. The author, who presented a paper at the conference, took the opportunity to review

what else was being discussed.

Looking through the papers, it is notable how few were focused on issues related to user needs and user behaviour. Roxanne Missingham from CSIRO [26] presented a paper under the 'Future Trends' theme entitled 'Science and Technology: a Web of Information – Impact of the Electronic Present and Future on Scientists and Libraries'. In this she looked at two perspectives on information discovery, one from the point of view of librarians, the other from the point of view of scientists. For the library, the main change from the 70's and 80's to the 90's was the move away from a highly structured information chain, with search specialists and libraries central to the process. The 90's saw the arrival of end-user access to networked resources resulting in users carrying out their own searches, and only coming the library after the event to supplement and evaluate the outcomes of inadequate searches. The result is a quickly changing role for science librarians, with an increasing need to develop specialist subject knowledge, to work more closely with researchers, and develop skills and knowledge of publishing and resources.

From the scientists point of view, she notes the major impact networked services have had on the time and effort needed to review literature at the beginning of a project. She also notes the importance of the role of browsing for keeping up to date in an area, and the fact that networked services don't improve browsing efficiency to the same extent as searching. A survey carried out in 1997 looked at what clients wanted from libraries. It was found that they valued service and quality, up-to-date information. Timeliness was an important factor. There were age differences with, for example, older staff giving a lower priority to the library web site compared with younger staff. There were discipline variations too, and an example is biologists particular need for access to current material, and their quickness to take up services such as Medline and full text electronic publishing. Finally she notes complex differences in information needs by age, stage of career and stage in the research process, and differences in what is available in the information market in different disciplines.

In the Digital Libraries Forum, Peter Lyman talked about 'The Social Functions of Digital Libraries'. He posed the question 'What should a digital library be and do?' He pointed out that the digital library is still a metaphor, not yet a social institution. He suggested that the future is very unlikely to be like the present, and that there is an historic change taking place in the relationship between information and the economy, from energy-rich to information-rich. If information is a raw material, Lyman suggests that value shifts from information itself to its use, and from producer to consumer, and a possible key to success is providing more services. Finally he states that it is more important to envision the digital library that we would like to build than the one we may be forced to accept. In a pre-conference workshop, Lyman had also pointed out that at Berkeley library, circulation figures were down for the first time, and that the Web has become the information resource of first resort.

Dr Patricia Milne from the University of Canberra noted in her paper 'Electronic access to Information and its impact on Scholarly Communication' that research has shown that disciplinary culture does affect academics' adoption of the new technologies. She quotes Peter Lyman as saying that as academic libraries moved from collection building to access, in many cases scholars were not consulted. Although she admitted that the study comparing differences in behaviour at the Australian National University (ANU) between 1991 and 1994 was rather old, she claimed that the number of empirical studies relating to academics' use of information and communication technology still remains small. The study noted distinct differences between disciplines. Social scientists for example rated libraries as less important to their work than their personal collections. Scientists showed a particularly strong move towards do-it-yourself searching, and scientists reported networked access to online database as very important. There was a change in the pattern of visiting the library, with few daily visits, but more frequent weekly or monthly visits. There was also a decrease in the number visiting rarely. She concluded by saying that advances in ICT will continue to affect the working patterns of academics, and although the number of studies on this issue are small, she claims the changes will affect "in the broadest sense, the whole of society".

Lynne Brindley (Librarian and Pro Vice-Chancellor from the University of Leeds in the UK) in her paper reviewing eLib – the UK's Electronic Libraries Programme [27] – commented that the ways in which academics use journals hasn't changed much during the life of the programme, with most still wanting print copies for annotation. With the exceptions of a few key disciplines (Physics, Computer Science and Mathematics) deep cultural changes will need to take place before there is large scale system-wide uptake of innovative scholarly communication.

5.4 Corporate users

A recent one-day conference organised by the UK Serials Group [28] entitled 'Electronic Journals in the Corporate Environment' reviewed the issues surrounding the use of journals in the non-academic sector, and demonstrated that there are some important differences. Martin White summarised some of these as:

- Academic users – just-in-case, authors, networked, research and teaching driven, single geographical place, professional library support
- Corporate users – just-in-time, readers, intranet/extranet users, project-related, multi-national, multi-site, limited professional library support

Roger Brown of SmithKline Beecham reported on his company's experiences with e-journals. In general, they wanted unbundled titles, easy authorisation (ideally by IP address), timely delivery, and a range of price options including buying by journal title or by article. The positive characteristics of e-journals were perceived as being publication before paper, simultaneous access by many users, the ability to integrate material with other work, access from the desk, and speed of access. The negatives were problems with ergonomics and eye strain; users found browsing on-screen tiring and scanning difficult, they regretted the lack of serendipity, and criticised the quality of the graphics and figures.

In the future these commercial users wanted to see more titles, progress on licensing to ease the problems of access by members of large, multi-national companies, and linking from current awareness services to full text delivery.

5.5 SuperJournal project findings

The SuperJournal project [29] was one of the flagship projects in the UK's JISC eLib programme. It was a 3 year research project (1996-98) focused on electronic journals and involved 16 publishers and 15 universities. Its remit was to investigate what academic researchers value in electronic journals, the factors that will make them successful in the future, and the implications for libraries and publishers. Although a full report on the project has yet to be published, a recent one-day conference presented an overview of the project's major findings, a few of which are summarised here.

The core user requirements were identified as:

- Fast and easy access to a critical mass of journals
- Functionality including browsing, searching and printing
- A substantial backfile of between 5 and 10 years (depending on discipline)
- Gateways supporting 'one-stop shopping' facilitating discipline-specific discovery

Key user benefits were identified as convenience, keeping up to date, saving time, and managing journal literature more easily and efficiently.

The project identified differences in behaviour between science and social science users. Science users were said to be more competitive and spent more time checking on what was being published in their area. Social Scientists were more task-driven, using journals to write an essay, prepare a lecture etc. Scientists

particularly appreciated high quality graphics, especially colour. Both groups valued printed journals as being easy to read with high quality presentation. They liked to photocopy articles in order to 'own' them, annotate them, store them.

The availability of e-journals resulted in fewer visits to the library, though e-journals were not seen as a replacement for the library which had other valued assets, especially the staff. Rather they were viewed as a replacement for the *process* of getting copies of articles quickly and easily without a physical visit. They were also seen as a way of extending the range of journals consulted.

Users valued the notion of journal clusters (a feature of the project which concentrated on four specific subject areas; Molecular Genetics & Proteins, Polymer Science, Communication and Cultural Studies, and Political Science). The size of the cluster thought to be ideal varied, some wanting around 20-50 journals, others 100-500. The number thought relevant to any individual was much smaller, around 5-10.

A backfile of 5-10 years worth of journals was thought to be very important, with Science users averaging 7 years as their ideal, and Social Scientists averaging 11 years. This would seem to be a major constraint slowing the early take-up of e-journals in a big way, since there are very few mainstream publishers providing electronic access to more than about 3 - 4 years worth of material at the time of writing. It also suggests that Science users might be satisfied with e-journals as their mainstream source of material earlier than Social Scientists.

One of the purported advantages of e-journals is the ability to create added value by including multimedia content, such as sound or moving images. Although 61% of authors used some form of multimedia in their work, only 36% thought being able to include this material in journal articles would be an advantage. Another eLib e-journal project, focusing on organic chemistry (CLIC) [30], found a similar reluctance by authors to bother with multimedia.

Finally, users still value print, with most printing out articles rather than reading on screen. Many said that annotating articles helped them understand them. Almost universally, users preferred to print PDF files rather than HTML. When viewing on screen, HTML was liked for web applications, but the poor presentation of tables and equations was criticised.

In her summing up of the one-day conference, Lynne Brindley commented that the project highlighted the urgent need to continue to track changing user behaviour. She also made the point that libraries have always been second best to scholars own personal collections. She emphasised the importance of a rigorous national strategy on the creation of a sustainable archive, and the importance of new strategic alliances mixing collaboration with competition. ***5.6 Summary***

So what conclusions can we draw from this collection of evidence? Perhaps the first and most obvious point is that the ready availability of a technology does not guarantee its immediate take-up and exploitation. People (customers) have to perceive some personal advantage before changing well established practices. Nevertheless younger, more IT- and network-aware academics and students are showing signs of a greater readiness to embrace new technologies and new methods of working.

We have seen evidence that although changes are taking place, the speed of adoption of new services and opportunities varies both with subject-specialisation and age. There is clear evidence, for example, of differences between scientists and social scientists. Scientists seem to be taking to electronic access more quickly than social scientists, tend to be less put off by the limited time coverage of most services, and in a competitive research environment, value the ability to quickly check on what others are publishing. With their need for a more diverse mix of sources, especially books, social scientists are less likely to find network resources to be central to their work.

In general, users tend to be pragmatic, with pretty interfaces being much less important than speed and predictability. Many academics need to refer to material published over a much greater time-span than most electronic journals, and even many bibliographic databases. While they appreciate the speed and convenience of on-screen delivery, they still see their library as an important resource, not least as a source of support and guidance, as well as material not yet available electronically.

There is evidence though that the ability to access full text articles electronically from the desk-top is seen as extremely attractive, with the only major negative factors being the limited amount of material currently available, both in terms of numbers of titles and time span covered. Despite this, having identified an article using the network in this way, most people still click the 'print' option to read, annotate and file it.

Many (most?) academics like to be in control of their information environment. Personal database products such as EndNote are popular, presumably because it enables them to use more efficient technologies to manage their personal collection of reference material. Several examples were quoted where users seem to prefer services that move the centre of gravity of their interaction with services closer to their desktop. E-mailing of search results for further sorting and processing seems very popular, as are current awareness services that deliver to the users mailbox.

One area where users do seem to appreciate remote services is where those relevant to their particular discipline are gathered together in one place, such as Subject-based Gateways or portal sites. These are electronic metaphors for the physical subject areas of general libraries, or departmental libraries. Nevertheless, they will still be only one of a portfolio of reference services that any one student or researcher are likely to want to consult, not an answer to all their information needs.

Conclusions

My first conclusion is that we are in increasing need of research into how user behaviour is changing as new services and new opportunities for changed methods of research and working evolve. This research needs to be ongoing, as clearly both services and people's experience of them is changing all the time. All parts of the information chain need to understand what is going on in order to adjust their services to best effect.

What does seem to be clear is that the Holy Grail of one all-purpose service satisfying the needs of all users, or even a section of them, is simply not going to be possible. The information needs vary too much by discipline, by age and by experience for this ever to be achieved. This isn't to deny the value of gateways and portals. In the increasingly complex world of the Internet, some sort of structure is clearly to be welcomed, and these sorts of services will surely increase in number and value. In the UK, the efforts being devoted to make the idea of a Distributed National Electronic Resource (DNER) a reality seem likely to bear fruit, though there is a wide variation in opinion as to precisely what form it will take.

So to try to answer the question in the title, is the customer always right? Despite the cynical comments from some parts of the information profession, in the end it is a service industry and if it doesn't deliver the goods, the users of the services, the customers, will vote with their fingers and go elsewhere. In the world of high speed international networking, for both research and teaching, this is becoming an increasing reality. It is our job to try to understand our customers and their needs in order to better serve them.

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